Claims:

1. A charged particle beam apparatus comprising:

a charged particle source for producing a primary beam of charged particles,

a condenser lens for shaping said primary beam of charged particles,

beam shaping means for collimating said primary beam of charged particles, wherein said beam shaping means is adapted to switch between a collimation of said primary beam to a width appropriate for serial imaging as well as a collimation of said primary beam to a width appropriate for parallel imaging,

scanning means for deflecting said primary beam of charged particles,

an objective lens for focusing said primary beam,

a sectorized detector for detecting secondary charged particles.

2. The apparatus according to claim 1, wherein said primary beam width appropriate for serial imaging is between 1 nm and 100 nm, preferably between 1 nm and 50 nm, and is especially preferably about 2 nm.

3. The apparatus according to claim 1, wherein said primary beam width appropriate for parallel imaging is between 0.5 μm and 1000 μm, preferably between 1 μm and 100 μm, and is especially preferably about 10 μm.

4. A charged particle beam apparatus comprising:

a charged particle source for producing a primary beam of charged particles,

a condenser lens for shaping said primary beam of charged particles,

aperture means for collimating said primary beam of charged particles,

scanning means for deflecting said primary beam of charged particles,

an objective lens [for focusing said primary beam, wherein said objective lens is adapted to switch between forming an image of said particle source in a plane of a surface of a sample to be serially inspected and forming an image of said aperture means in a plane of a surface of a sample to be parallel inspected,

a sectorized detector for detecting secondary charged particles.

5. The apparatus according to claim 4, wherein said beam shaping means comprises said condenser lens and said condenser lens is adapted to switch the beam width of said primary beam between a width appropriate for serial imaging and a width appropriate for parallel imaging.

6. The apparatus according to claim 4, wherein said beam shaping means is an aperture having a diameter in the range of 10 μm to 50 μm in the case of serial imaging, and wherein the beam shaping means is an aperture having a diameter in the range of 100 μm to 200 μm in the case of parallel imaging.

7. The apparatus according to claim 4, wherein said sectorized detector is a multichannel plate with sectorized anode or an array of semiconductor detectors.

8. The apparatus according to claim 4, further comprising a movable stage for supporting and moving a sample.

9. The apparatus according to claim 4, further comprising a light source for producing a light beam.

10. The apparatus according to claim 9, wherein the wavelength of the light produced by said light source comprises the range of 200 nm to 300 nm.

11. The apparatus according to claim 9, wherein the light source further comprises means for forming a parallel light beam.

12. The apparatus according to claim 9, further comprising blanking means for blanking said primary beam of charged particles.

13. A method for serially operating the charged particle beam apparatus comprising the steps of

providing a charged particle beam apparatus;

adjusting beam shaping means for collimating a primary beam of charged particles as to collimate said primary beam of charged particles to a width appropriate for serial imaging of a sample,

scanning said sample using scanning means, wherein said primary beam of charged particles is directed to a respective position of a single pixel on said sample,

and

detecting secondary charged particles by means of a sectorized detector, wherein signals produced by individual sectors of said detector are merged to form a signal corresponding to said single pixel.

14. A method for operating the charged particle beam apparatus in a parallel imaging mode, comprising the steps of

providing a charged particle beam apparatus;

adjusting beam shaping means for collimating a primary beam of charged particles as to collimate said primary beam of charged particles to a width appropriate for parallel imaging of a sample,

directing said primary beam of charged particles to a predetermined position on said sample, and

detecting secondary charged particles by means of a sectorized detector, wherein the signals produced by individual sectors of said detector are individually collected.

15. A method for operating the charged particle beam apparatus according to in a parallel imaging mode, comprising the steps of

providing a charged particle beam apparatus,

adjusting beam shaping means for collimating a primary beam of charged particles as to collimate said primary beam of charged particles to a width appropriate for parallel imaging of a sample,

producing a light beam,

directing said primary beam of charged particles and said light beam to a predetermined position on said sample, and

detecting secondary charged particles by means of a sectorized detector, wherein the signals produced by individual sectors of said detector are individually collected.

16. The method according to claim 15, wherein the charged particle beam and the light beam are adjusted to cancel a charge build-up on the sample surface.

17. The method according to claim 15, wherein the primary beam of charged particles is blanked by blanking means.

18. A method for operating the charged particle beam apparatus according to claim 9, wherein the method of operation of the charged particle beam apparatus is switched in operation between at least two of modes SEM, SEEM, PEEM or SEEM/PEEM.

19. A method for operating a charged particle beam apparatus comprising a particle source, an aperture, a scanning means, an objective lens and a stage on which a sample may be disposed, said method comprising the steps of:

generating a primary beam of charged particles by said particle source,

collimating said primary beam by said aperture,

focusing said collimated primary beam by said objective lens, wherein said objective lens is adjusted to form an image of said aperture in the working plane of said objective lens.